REMARKS/ARGUMENTS

Claims 1-7 are present in this application. By this Amendment, the Abstract of the

Disclosure, the specification and claim 1 have been amended, and claim 7 has been added.

Reconsideration in view of the above amendments and the following remarks is respectfully

requested.

Claims 1, 3 and 5 were rejected under 35 U.S.C. §103(a) over U.S. Patent No. 4,912,318

to Kajiura et al. in view of U.S. Patent No. 3,202,761 to Bibbero. This rejection is respectfully

traversed.

An important feature of the invention resides in an apparatus that discriminates different

test tube types to determine a type of each of a plurality of test tubes held in a test tube rack. The

invention utilizes an image of opening and side patterns of each of the test tubes, via either one

camera or two, and compares the opening and side patterns with plural standard opening and side

patterns of the test tubes stored in a standard pattern memory. Although the Office Action

contends that "Kajiura teaches a test tube type discrimination apparatus," this characterization of

the Kajiura patent is inaccurate.

For example, in the Kajiura patent, Figs. 10A and 10B show the product 1 and a related

wave form observed by imaging and image processing the product 1, respectively. In Fig. 10A,

defects 43 (such as dirt and foreign matter) are present on the wall in the portion in which the

powder 42 is contained and in a cavity portion 44, respectively, in the product 1 such as a phial.

A part of the powder 42 may adhere to the wall of the cavity 44. Under such condition, when the

product 1 is lit by lighting devices for inspection shown in Figs. 7-9 to be imaged and appearance

inspected, the wave form obtained is uniform regardless of the portion contained with the

powder 42 and of the cavity portion 44, allowing only the presence of the defects 43 to be

evidently detected (in Fig. 10B, reference numeral 45 indicates the presence of defects). See, for example, column 6, lines 39-54.

In this context, defects such as dirt and foreign matter adhering to the wall of the product 1 may be recognized by the use of the technique described in the Kajiura patent. In contrast with the invention defined in claim 1, however, Kajiura does not remotely mention any technique to discriminate types of a plurality of test tubes. Moreover, first and second images of the test tube from a longitudinal direction and a lateral direction of the test tube are not picked up.

In an effort to clarify these distinctions, claim 1 has been amended to more clearly define test tube type discrimination features of the apparatus. In particular, claim 1 defines a pattern recognition unit that receives data of the first and second images and extracts an edge of each of the first and second images to recognize opening and side patterns of each of the test tubes. Moreover, a comparison determination unit compares the opening and side patterns recognized by the pattern recognition unit and the plural standard opening and side patterns of the test tubes stored in the standard pattern memory to determine a type of each of the test tubes. Kajiura lacks any such structure, and for at least this reason, Applicant respectfully submits that the rejection is misplaced.

Additionally, the Office Action contends that Kajiura discloses "first and second electronic cameras that pick up images of the test tubes." The Kajiura patent, however, does not disclose any arrangement where an electronic camera is utilized to recognize both opening and side patterns of each of the test tubes. Claim 1 recites that first and second electronic cameras pick up respective first and second images of the test tube from a longitudinal direction and a lateral direction of each of the test tubes. In contrast, Kajiura shows imaging devices 12a-12g, one each for each of the products 1 supported on the pedestal 7 of the indexing table 6. See, e.g.,

Figs. 1 and 3. Kajiura describes that where the products 1 are phials, the cap top face, head side, shoulder side of containers, side, surface of contents, and bottom face can be inspected. The surface to be inspected is properly selected according to the object of inspection. See column 4, lines 9-15. As such, depending on the object of inspection, the cameras are positioned appropriately relative to the products 1. Figs. 4a and 4b show the same electronic camera 12a. Nowhere does the Kajiura patent even remotely suggest that multiple images of the products 1 can be utilized for any type of processing and certainly not in order to determine a type of each of a plurality of test tubes.

In the invention defined in claim 1, the first electronic camera picks up an image from an opening of each of the test tubes, and the second electronic camera picks up an image from a side thereof. The pattern recognition unit extracts an edge of each of the captured images to recognize a test tube pattern of each of the test tubes including opening and side patterns of each of the test tubes. Thus, the opening patterns of the test tubes, i.e., the shapes of the openings thereof and the side patterns seen from the side thereof, can be recognized. That is, the pattern recognition unit of the invention defined in claim 1 recognizes appearance patterns of the test tubes based on the edge extracted from the captured images. Subsequently, the comparison determination unit compares the recognized test tube pattern and the standard patterns of the test tubes stored in the standard pattern memory to determine a type of each of the test tubes.

The Bibbero patent merely teaches a pattern recognition by comparing an input pattern and a standard pattern. The Bibbero patent, however, does not correct the deficiencies noted above with regard to Kajiura.

Applicant thus respectfully submits that the rejection of claim 1 is misplaced.

With regard to dependent claims 3 and 5, Applicant submits that these claims are allowable at least by virtue of their dependency on an allowable independent claim.

Reconsideration and withdrawal of the rejection are respectfully requested.

Claim 7 has been added and serves as a linking claim between the distinct species of invention previously indicated. Applicant respectfully submits that claim 7 is allowable for reasons similar to those discussed above with regard to claim 1. For example, claim 7 defines a test tube type discrimination apparatus. The Kajiura patent lacks any such discrimination apparatus. Moreover, claim 7 defines a pattern recognition unit that receives data of at least one image picked up by the at least one camera and extracts an edge of the at least one image to recognize opening and side patterns of each of the test tubes. As described in the specification, the recognition of opening and side patterns of each of the test tubes can be achieved via first and second cameras as defined in claim 1 or by a single camera that images an integral inclined pattern of opening and side patterns of each of the test tubes.

In view of the foregoing amendments and remarks, Applicant respectfully submits that the claims are patentable over the art of record and that the application is in condition for allowance. Should the Examiner believe that anything further is desirable in order to place the application in condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Prompt passage to issuance is earnestly solicited.

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Respectfully submitted,

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